

CLAIMS

1. A method for concurrently forming a plurality of integrated circuit products,
5 said method comprising:
- providing a multi-instance leadframe or substrate having a plurality of instances;
- attaching one or more dies to each of the instances on at least one side of the multi-instance leadframe or substrate;
- 10 electrically connecting each of the one or more dies to the respective instance of the leadframe or substrate;
- thereafter encapsulating together the plurality of instances on the at least one side of the multi-instance leadframe or substrate with a molding compound; and
- subsequently singulating each of the plurality of instances using at least non-
15 linear shaping of at least one region of each of the plurality of instances, thereby forming the integrated circuit products.
2. A method as recited in claim 1, wherein said electrically connecting includes at least wire bonding each of the one or more dies to the respective instance of the
20 leadframe or substrate.
3. A method as recited in claim 1, wherein said encapsulating forms a molded panel.
- 25 4. A method as recited in claim 1, wherein said singulating is performed by a laser beam provided by a laser.
5. A method as recited in claim 1, wherein said singulating is performed by a high pressure water jet.

6. A method as recited in claim 5, wherein the water jet includes at least water and an abrasive material.

5 7. A method as recited in claim 1, wherein the substrate is a printed circuit board.

8. A method as recited in claim 1, wherein the passive components include at least one of a resistor and a capacitor.

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9. A method as recited in claim 1, wherein the one or more dies are semiconductor dies.

10. A method as recited in claim 1, wherein the integrated circuit products are memory cards.
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11. A method as recited in claim 1, wherein the integrated circuit products are removable, non-rectangular peripheral cards.

20 12. A method as recited in claim 1, wherein said method further comprises:
attaching, prior to said encapsulating, one or more passive components to each of the instances.

13. A method as recited in claim 1, wherein said method further comprises:
25 applying a mark to the molding compound for each of the plurality of instances.

14. A method as recited in claim 13, wherein the mark is a printed mark.

15. A method as recited in claim 1,

wherein said encapsulating forms a molded panel, and

wherein said singulating of each of the instances cuts the molded panel into a
5 plurality of molded packages which are the integrated circuit products.

16. A method as recited in claim 15, wherein the molded packages are memory
cards.

10 17. A method as recited in claim 16, wherein said method further comprises:
applying a coating to each of the memory cards after said singulating.

18. A method as recited in claim 16, wherein said method further comprises:
affixing an outer casing to each of the memory cards after said singulating.

15 19. A method as recited in claim 1, wherein the non-linear shaping of each of the
instances by said singulating is achieved through curvilinear or non-rectangular
cutting during said singulating.

20 20. A method as recited in claim 1, wherein electrically testing the instances is
performed after said encapsulating and before said singulating.

21. A method as recited in claim 1, wherein said method further comprises:
applying a coating to each of the instances after said singulating.

25 22. An integrated circuit product produced in a batch by the operations that
include at least:

providing a multi-instance leadframe or substrate having a plurality of instances;

attaching one or more dies to each of the instances on at least one side of the multi-instance leadframe or substrate;

5 electrically connecting each of the one or more dies to the respective instance of the leadframe or substrate;

thereafter encapsulating together the plurality of instances on the at least one side of the multi-instance leadframe or substrate with a molding compound; and

10 subsequently singulating each of the plurality of instances using at least non-linear shaping of at least one region of each of the plurality of instances,

whereby one of the plurality of instances being produced by said operations is said integrated circuit product.

23. An integrated circuit product as recited in claim 22, wherein said integrated
15 circuit product is a memory card.

24. An integrated circuit product as recited in claim 22, wherein said integrated circuit product is a removable, non-rectangular peripheral card.

20 25. An integrated circuit product as recited in claim 22, wherein the non-linear shaping of each of the instances by said singulating is achieved through curvilinear or non-rectangular cutting during said singulating.

26. An integrated circuit product as recited in claim 22, wherein an additional
25 operation used in producing said integrated circuit product comprises affixing an outer external package about each of the instances after said singulating.

27. A method for concurrently forming a plurality of memory cards, each of the memory cards including at least a memory die and a controller die, said method comprising:

providing a multi-instance leadframe having a plurality of instances;

5 attaching the multi-instance leadframe on a removable tape;

placing die attach material on a portion of each of the instances of the multi-instance leadframe;

attaching the memory die to each of the instances via the die attach material corresponding to each of the instances;

10 affixing the controller die with respect to each of the instances;

electrically connecting each of the memory die and the controller die to the respective instances of the multi-instance leadframe;

thereafter encapsulating together the instances with a molding compound;
and

15 subsequently singulating each of the instances using at least non-linear shaping of at least one region of each of the plurality of instances.

28. A method as recited in claim 27, wherein the removable tape is a polymer tape.

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29. A method as recited in claim 27, wherein said affixing operates, for each of the instances, to mount the controller die on the memory die, whereby the controller die is stacked on the memory die.

25 30. A method as recited in claim 27, wherein said method further comprises:

removing the removable tape after said encapsulating and before said singulating.

31. A method as recited in claim 30, wherein each of the instances include exposed electrical contacts as part of the leadframe of the respective instance.

32. A method as recited in claim 31, wherein said method further comprises:

5 plating the electrical contacts of each of the instances after said removing of the removable tape and before said singulating.

33. A method as recited in claim 27, wherein said electrically connecting includes at least wire bonding each of the memory die and the controller die to the respective
10 instances of the multi-instance leadframe.

34. A method as recited in claim 27, wherein said singulating is performed by a laser beam provided by a laser.

15 35. A method as recited in claim 27, wherein said singulating is performed by a high pressure water jet.

36. A method as recited in claim 35, wherein the water jet includes at least water and an abrasive material.

20 37. A method as recited in claim 27, wherein the memory cards are molded cards, each of the molded cards having a housing provided by the molding compound without any additional external casing.

25 38. A method as recited in claim 27, wherein the memory cards are removable, non-rectangular peripheral cards that provide data storage.

39. A method as recited in claim 27, wherein said encapsulating operates to encapsulate at least one side of the leadframe having the instances of the memory

die and the controller die attached thereto, thereby encapsulating the memory die and the controller die.

40. A method as recited in claim 27, wherein the non-linear shaping of each of the instances by said singulating is achieved through curvilinear or non-rectangular cutting during said singulating.

41. A method as recited in claim 40, wherein said method further comprises:
affixing an outer external package about each of the instances after said singulating.

42. A method for concurrently forming a plurality of memory cards, each of the memory cards including at least a memory die and a controller die, said method comprising:

providing a multi-instance printed circuit board having a plurality of instances;
attaching the memory die with respect to each of the instances;
affixing the controller die with respect to each of the instances;
electrically connecting each of the memory die and the controller die to the respective instances of the multi-instance printed circuit board;

thereafter encapsulating together the instances with a molding compound;
and

subsequently singulating each of the instances using at least non-rectangular shaping.

43. A method as recited in claim 42, wherein said affixing operates, for each of the instances, to mount the controller die on the memory die, whereby the controller die is stacked on the memory die.

44. A method as recited in claim 43, wherein, for each of the instances, the memory die is mounted on the printed circuit board.

45. A method as recited in claim 42, wherein each of the instances include
5 exposed electrical contacts on the printed circuit board.

46. A method as recited in claim 42, wherein said electrically connecting includes at least wire bonding each of the memory die and the controller die to the respective instances of the multi-instance printed circuit board.

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47. A method as recited in claim 42, wherein said singulating is performed by a laser beam provided by a laser.

48. A method as recited in claim 42, wherein said singulating through use of a
15 laser beam and water.

49. A method as recited in claim 42, wherein said singulating is performed by a high pressure water jet.

20 50. A method as recited in claim 49, wherein the water jet includes at least water and an abrasive material.

51. A method as recited in claim 42, wherein the memory cards are molded cards, each of the molded cards having a housing provided by the molding compound
25 without any additional external casing.

52. A method as recited in claim 42, wherein the memory cards are removable peripheral cards that provide data storage.

53. A method as recited in claim 42, wherein said encapsulating operates to encapsulate at least one side of the printed circuit board having the instances of the memory die and the controller die attached thereto, thereby encapsulating the memory die and the controller die.

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54. A method as recited in claim 42, wherein said method further comprises:
affixing an outer external package about each of the instances after said singulating.

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